#2 #293 $\frac{1}{20}\left(\sqrt{\frac{1}{20}}+\sqrt{\frac{2}{20}}+\sqrt{\frac{3}{20}}+\dots+\sqrt{\frac{20}{20}}\right)$

$$\int_a^b f(x)\,dx \approx \sum_{k=1}^{n} f(a+k\cdot h)\cdot h$$

$h=\frac{1}{20}$ $\qquad h\left[f(a+h)+f(a+2h)+f(a+3h)\dots\right]$

$f(x)=\sqrt{x}$ $\qquad \frac{1}{20}=\frac{b-0}{20}$ $\qquad \boxed{\int_0^1 \sqrt{x}\,dx}$

$a=0$ $\qquad b=1$

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HW.

30 $\int_1^4 -x^{-2}\,dx = \left.\frac{-x^{-1}}{-1}\right|_1^4$

$\int x^n\,dx = \frac{x^{n+1}}{n+1}$ $\qquad = \left.\frac{1}{x}\right|_1^4$

$$= \frac{1}{4}-\frac{1}{1} = -\frac{3}{4}$$

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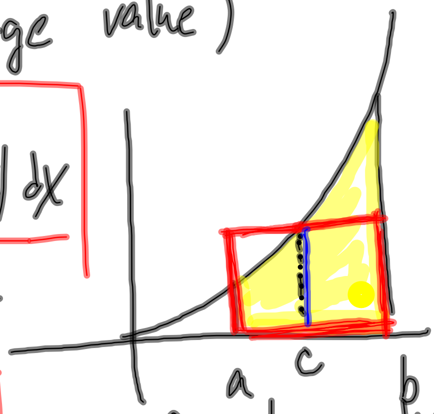
5.3 b MVT for definite integrals

(Mean Value Theorem)

(average value)

$$\boxed{(b-a)f(c) = \int_a^b f(x)\,dx}$$

area of rectangle yellow area



area of rect. = value of definite integral

$$\boxed{f(c) = \frac{1}{b-a}\int_a^b f(x)\,dx}$$

average value of f(x) on [a, b]

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(2) Find the value that satisfies the mean value Theorem for definite integrals (find c)

(1) Find the average value of f(x) on [a,b] (find f(c))

$y = x^2$, $[1,3]$

(1) $f(c) = \frac{1}{3-1}\int_1^3 x^2\,dx = \frac{1}{2}\left(\frac{x^3}{3}\Big|_1^3\right)$

$= \frac{1}{2}\left(\frac{3^3}{3} - \frac{1^3}{3}\right) = \frac{1}{2}\cdot\frac{26}{3} = \frac{13}{3}$

(2) $f(c) = c^2 = \frac{13}{3}$

$c = \sqrt{\frac{13}{3}} \approx 2.0817$

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Find the value that satisfies the MVT for definite integrals for $f(x)=4-x^2$ on $[0,3]$

$$f(c)=\frac{1}{3-0}\int_0^3 4-x^2\,dx$$

$$=\frac{1}{3}\left(4x-\frac{x^3}{3}\right|_0^3$$

$$=\frac{1}{3}\left(\left(12-\frac{27}{3}\right)-(0-0)\right)$$

$$=1$$

$$f(c)=4-c^2$$

$$1=4-c^2$$

$$3=c^2$$

$$c=\pm\sqrt{3}$$

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